

REMARKS

Original claims 1 through 20 continue to be pending without amendment, and claims 21-24, set out above, are submitted for introduction.

No new matter is introduced by these new claims.

It is requested in view of the following discussions and new claims that all rejections and objections reported in the outstanding Office action be reconsidered and not repeated in any further action issued for this application.

Claim Rejections – 35 USC §102

Claims 1, 2 and 5 are reported rejected under 35 USC §102(e) as being anticipated by US Patent 6,273,022 (Pu et al.). In view of the following discussions, it is believed all reported anticipation rejections are overcome.

It is reported in the Office action, with respect to the asserted anticipation rejection of claim 1, that:

Pu discloses a matching network (See Figure 9) for coupling an RF power supply (32) to an RF antenna (42) in a plasma generator comprising:

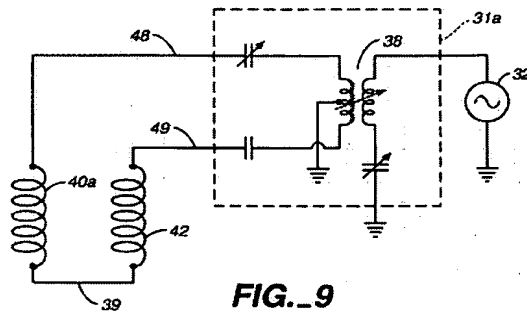
- a resonantly tunable circuit of a variable capacitor and an inductor (40a) in a series resonance configuration;
- a ferrite core transformer (38) coupled to the resonantly tunable circuit. (Office action, page 2-3)

These characterizations of Pu et al. disclosures are traversed. The matching network shown in Pu et al. Figure 9 is labeled as being within hatched box 31a (See, column 12, lines 63-66; and column 13, lines 21-23). With respect to this matching network, Pu et al. discloses that:

In the Fig. 9 design, the impedance matching network 31a employs a transformer 38 to convert the unbalanced output of the power supply 32 to a balanced output 48, 49. A disadvantage of the Fig. 9 design is that it is difficult to design an efficient, high power, RF transformer, i.e., one which can withstand high RF voltage without arcing, which has

sufficiently low resistance to achieve high efficiency, and which has a high coefficient of coupling between the primary and secondary windings. (column 13, lines 21-29)

Figure 9 is reproduced here to assist in appreciating these disclosures. Most specifically, it is disclosed in Pu et al. that the Figure 9 matching network 31a



includes a transformer 38, two unlabeled apparent variable capacitors and an unlabeled apparent fixed value capacitor. The Pu et al labeled impedance matching network does not include an inductor. It is asserted in the Office action that Pu et al. discloses “a resonantly tunable circuit of a variable capacitor and an inductor 40a in a series resonance configuration.” This assertion of coil 40a in any way being a matching network component inductor is traversed. Reference to Pu et al. Figure 9 shows coils 40a and 42 being series connected with a conductor 39, and reference to Pu et al. disclosures from column 12, line 62, to column 13, line 9, explain that these paired coils 40a and 42 magnetically interact. Further it is disclosed that junction 39 “is at electrical ground potential because the two outputs [i.e., 48 and 49] of the matching network are balanced relative to the grounded transformer center tap.” These magnetically interacting, i.e., inductively coupled coils, are, as a pair, the Pu et al. antenna used to transfer power to a plasma. With respect to Pu et al. Figure 9, the disclosed impedance matching network outputs provide power to the pair of antenna coils from outputs 48 and 49. Pu et al. does not disclose or suggest “coupling an RF power supply to an RF antenna” using any “resonantly tunable circuit formed of a variable capacitor and an inductor in a series resonance configuration” as is recited in pending original claim 1. the Pu et al. coils 40a and 42 are a paired antenna structure. The Pu et al. matching network 31a is to provide RF power to this paired coil/antenna structure. In fact, Pu et al. disclose that this

impedance matching network 31a has a “disadvantage” as is reproduced above from column 13, lines 21-29. Therefore, Pu et al. in no way anticipates original claim 1.

Attention here exclusively is directed to rejected independent claim 1 because if an independent claim rejected as being anticipated subsequently is shown to recite allowable subject matter over a cited patent all of the claims dependent from that amended independent claim also recite allowable subject matter.

These conclusions concerning overcoming reported anticipation rejections, in at least part, are premised from the fact that:

[F]or [there to be] anticipation under 35 USC 102, the reference must teach every aspect of the claimed invention either explicitly or impliedly. Any feature not directly taught must be inherently present. (Emphasis added, MPEP §706.02)

In this instance, as discussed above, the asserted Pu et al. patent does not directly or inherently teach “every aspect” of the invention recited in independent claim 1. Based on this requirement of patent law it is submitted above that Pu et al. in no way anticipates independent claim 1.

The part of these conclusions directed to dependent claims also reciting allowable subject matter is premised, at least in part, in the case of anticipation rejections from 35 USC §112 , paragraph 4, where it is directed that a “claim in dependent form shall be construed to incorporate by reference all the limitations of the base claim to which it refers.” Thus, rejected dependent claims here include every limitation recited in base independent claim 1 that is not disclosed or inherent in the Pu et al. asserted patent.

Accordingly, it is submitted that all anticipation reported rejected claims are not anticipated by the cited Pu et al. patent.

Claim Rejections – 35 USC §103

It is reported in the outstanding Office action that under 35 USC §103(a): (i) Claims 3, 4 and 6-10 are unpatentable over Pu et al ., and (ii) Claims 1-3, 6-14, 16, and 17 are

unpatentable over US Patent No. 4,629,887 (Bernier). In view of now submitted discussions it is believed all reported obviousness rejections are overcome.

Of the reported obviousness rejections only claims 1 and 12 are independent and all other reported obviousness rejections are directed to claims dependent from these two independent claims. Under these circumstances attention here will be exclusively directed to these two independent claims because if these two claims are patentable then all of their dependent claims also recite allowable subject matter.

Dependent claims are nonobvious under 103 if the independent claims from which they depend are nonobvious. (Citations omitted, In re Fine, 5 USPQ2d 1596, 1600 (Fed. Cir., 1988)).

Turning first to the group (i) rejections, as set out above, it is noted that all of obviousness reported rejections of claims 3, 4 and 6-10 over Pu et al. are directed at claims that are dependent from base independent claim 1, which is not reported rejected as being obvious over Pu et al. Failures inherent in Pu et al. are discussed above in detail with respect to this patent not directly or inherently teaching subject matter recited in claim 1. Accordingly, it is submitted that independent claim 1 also is nonobvious, and, therefore, all of claims 3, 4 and 6-10 also are nonobvious. These obviousness rejections of claims 3, 4 and 6-10 are traversed.

Now turning to the group (ii) rejections, as set out above, it is noted that these reported obviousness rejections are directed to both independent claims 1 and 12 and also to claims dependent from these two independent claims. All of these group (ii) rejections are reported as being premised from Bernier.

Specifically, it is reported in the Office action with respect to independent claim 1 that:

Bernier discloses a matching network for coupling an RF power supply (2 shown in Figs. 1, 2) to an RF antenna (Rt) in a plasma generator comprising:

- a resonantly tunable circuit formed of a variable capacitor (C) and an inductor (Lt) in a series resonance configuration;

- a transformer coupled to the resonantly tunable circuit (the transformer shown on the left side of the capacitor (C). See Figure 6). (Office action, page 5-6)

On examination of Bernier, and in particular on specific examination of Bernier disclosures as cited above, it is submitted that any conclusion that Bernier renders claim 1 obvious under 35 USC §103 is traversed. Pending claim 1 recites, in part, “a matching network for coupling an RF power supply to an RF antenna..., comprising: a resonantly tunable circuit formed of a variable capacitor and an inductor in a series resonance configuration....” Reference to Bernier, and in particular the cited Figures 1, 2 and 6, shows that the patent teaches that the Bernier asserted “inductor (Lt)” is in fact a “work coil” that transfers input RF power to a plasma, and that there is no “inductor in a series resonance configuration” with a “variable capacitor” that provides an “impedance matching capacitor.” These facts are established from at least the following Bernier disclosures:

FIG. 1 illustrates a schematic representation of an apparatus for analyzing the constituent elements of a sample of selected material. The apparatus is comprised of an exciter 1.... Exciter 1 is comprised of generator 2, power supply 3 and plasma torch 7. Plasma torch 7 includes a torch tube 6, work coil 19 and a gas supply 31. (Emphasis added; column 4, lines 6-12)

As shown in FIGS. 2 and 6, the invention advantageously separates tuning inductor 21 from work coil 19 with an impedance matching capacitor 17. (Emphasis added; column 5, lines 41-43)

FIG. 6 illustrates how the variation of the coupling factor can give stabilization. Arranged in series, Lt and Rt represent the effective impedance constituted by the plasma work coil and the plasma. (Emphasis added; column 7, lines 23-26)

The Bernier element “Lt” that is asserted as an “inductor (Lt)” component for a matching network in the Office action is in fact taught by Bernier as being an RF antenna to which RF power is to be provided from an “impedance matching capacitor” so that this power can be supplied to a plasma. The Bernier element “C” that is asserted as a “variable capacitor (C)” in the Office action is in fact taught by Bernier to be “an impedance matching capacitor.” The Bernier taught “impedance matching capacitor” does not include any “inductor (Lt)” because that element “Lt” is a Bernier work coil or RF antenna. So with “Lt” being a work coil – i.e., an RF antenna – the Bernier patent does not teach or suggest a

“matching network... comprising...a variable capacitor and an inductor in a series resonance configuration “ as is recited in claim 1.

Accordingly, it is submitted in line with the above discussions that reported obviousness rejections of claim 1 and claims dependent from that independent claim are overcome.

With respect to independent claim 12 it is reported in relevant part that:

Bernier discloses a plasma ion source comprising:

- a coaxial cable (W1 shown in Fig. 4) connected to the RF power supply;
- a matching network having an input connected to the coaxial cable, comprising:
- a resonantly tunable circuit formed of a variable capacitor (C17) and an inductor (L19) in series resonance configuration;
- a transformer coupled to the resonantly tunable circuit;
- a RF antenna (Fig. 7) connected to an output of the matching network;
- a plasma ion generator (19) having the RF antenna mounted therein for inductively generating plasma. (Office action, page 8)

With respect to these assertions, it is noted that after careful consideration of Bernier, no element “C17” was found with that specific label. A “coupling capacitor 17” is discussed at multiple disclosures, including column 4, line 51. There it is stated that:

Coupling capacitor 17 is preferably a vacuum, variable capacitor. Capacitor 17 couples rf power into work coil 19 and provides an impedance matching means to maximize the power delivered into the coil and into plasma 27. (Emphasis added; column 4, lines 51-55)

It is understood from these disclosures and Figure 2 that element 17 is a variable capacitor and that this element alone is taught as being “an impedance matching means.”

Further, it is noted that element number 19 is asserted in the Office action as being both an “inductor (L19)” and a “plasma ion generator (19).” Both of these assertions are traversed because Bernier exclusively discloses this element to be a “work coil 19” (e.g., see

column 4, lines 52-53). This Bernier “work coil 19” is addressed above in this paper in the context of all the Bernier disclosures that teach this element to be an RF antenna that is connected to impedance matching capacitor 17 that is supposed to deliver RF power “into the coil [19] and into plasma 27.” (Column 4, lines 52-55)

Here again, as discussed above in the context of independent claim 1, Bernier fails to teach or suggest a “resonantly tunable circuit formed of a variable capacitor and an inductor in a series resonance configuration” as is recited in independent claim 12.

It is not traversed that Bernier Figure 7 shows an RF antenna, as is asserted in the Office action, what is traversed is that the “work coil 19” shown in Figure 7 is an inductor included in a matching network as recited in both claims 1 and 12 because “work coil 19” is an RF antenna as is exclusively taught in Bernier.

Accordingly, it is submitted in line with the above discussions that reported obviousness rejections of claim 12 and claims dependent from that independent claim are overcome.

In conclusion all obviousness reported rejections are traversed as is discussed above.

Allowable Subject Matter

Claims 15 and 18-20 are reported in the Office action as being objected to for being dependent from a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

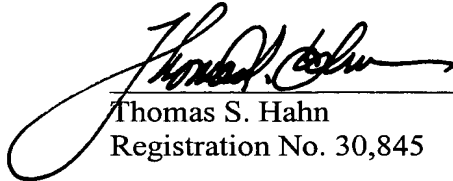
There is one rejected base claim in these circumstances, and it is independent claim 12. As discussed and submitted above, this independent claim and its respective dependent claims are all believed to be patentable and in no way rendered obvious by the asserted Bernier patent. Now, however, in order to advance prosecution, these claims have been rewritten to incorporate base claim recitations. These rewritten claims are here submitted as new claims 21-24. Their allowance as is stated in the Office action should now be in order. These four claims in their original forms also are retained for prosecution because of the above submitted discussions directed to their being in condition for allowance.

CONCLUSION

In light of the above discussions, it is believed that all previously pending claims and all now submitted new claims are in condition for allowance and a notice of the same is requested. Should the Examiner have any question, request or suggestion, he is invited to contact the undersigned attorney at the telephone number set out below.

Respectfully submitted,

Date: January 24, 2005



Thomas S. Hahn
Registration No. 30,845

Fulbright & Jaworski L.L.P.
801 Pennsylvania Avenue, NW
Washington, DC 20004-2623
Telephone: (202) 662-0278